REMARKS

Claims 1-18 and 20-30 remain in the application, with independent claim 1 amended to more particularly define the invention. Claim 19 is now included in claim 1 as amended, and claim 19 is now cancelled.

Reconsideration is respectfully requested for claims 1-18 and 20-30 as amended.

Claims 1-30 under 35 USC §102(a) as being anticipated by Liebchen U.S. Patent No. 6,738,859 the Examiner noting that Liebchen discloses a method and system for simulating image projection and alleging that the disclosed method is identical to the claimed method.

This rejection is respectfully traversed with respect to claims 1(amended) – 18 and 20-30. The claimed invention is directed to simulating light scattering in a optical imaging system where the light scattering is undesired and provides distortion in the optical imaging system. As described in the specification and as specified in claim 20, for example, the simulation of light scattering can be advantageously applied in inspecting photo masks and in optical proximity correction in mask design. Thus, the claimed invention is concerned with identifying defect which cause light scattering and then using the identified light scattering to correct a mask design, for example.

As defined by claim 1 as amended, the method for simulation of light scattering in large three dimensional objects in an optical imaging system comprises the steps of a) decomposing a three dimensional object into a plurality of elementary two dimensional objects, b) defining the two dimensional objects by edges of the objects, c) applying edge domain decomposition for the edges of the two dimensional objects to identify light scattering by the one dimensional edges, and d) summing scattered light from all edges to simulate light scattering in two dimensions.

While the cited Liebchen patent is concerned with optical systems and photo lithography, it should be noted that Liebchen is concerned with identifying the aerial image of a mask pattern. More particularly, Liebchen is concerned with simulating a projection lithography system using a Hopkins model, that does not use a numerically expensive Eigenvector diagonalization operation.

The Leibchen disclosure is summarized in claim 1 of the patent for a method for simulating an aerial image projected from an optical system, said optical system including a pupil and a mask plane, the method comprising the steps of: providing a mask to the mask, obtaining parameters, calculating a kernel based on an orthogonal pupil projections, obtaining parameters of the mask; calculating a vector based on the orthogonal mask projection, calculating a field intensity distribution, and obtaining the aerial image data from said field intensity distribution. Thus, while Liebchen is concerned with defining an aerial image of a photo mask, Liebchen does not show or suggest the identification of light scattering in the photo mask and particularly with applying edge domain decomposition for edges in the two dimensional mask to identify light scattering by the one dimensional edges, and then summing the scattered light from all edges to simulate light scattering in two dimensions.

While Liebchen and the claimed invention are both concerned with optical simulation as it applies in photo lithography, Liebchen is concerned with aerial image definitions and particularly with the two dimensional transmission cross co-efficient function (TCC) as used in a Hopkins model for defining the aerial image. On the other hand, the claimed invention is concerned with identifying error or light scattering in a optical imaging system using edge domain decomposition for edges of a two dimensional object and then summing scattered light from the edges to simulate light scattering in two dimensions. The objectives of Liebchen and of the claimed invention are entirely different.

Accordingly, it is respectfully submitted that the method for fast aerial image simulation disclosed by Liebchen neither shows nor suggests the claimed method for simulation of light scattering in an optical imaging system and particularly the use of edge domain decomposition for edges to identify the light scattering as claimed.

The Examiner has cited but not applied U.S. Patent No. 5,447,810, and U.S. Patent Publication US 2003/0064298 A1 which describes a photo lithography mask including a plurality of resolvable features to be printed on a substrate and at least one non-resolvable optical proximity correction feature. Neither reference is believed to be relevant to Applicant's claimed method for simulating light scattering as defined by claims 1-18 and 20-30.

Since claims 1(amended) –18 and 20-30 are patentable under 35 USC §102 and §103 over Liebchen, all as above set forth, it is requested that claims 1(amended) –18 and 20-30 be allowed and the case advance to issue.

Should the Examiner have any question or comment concerning the present amendment and response, a telephone call to the undersigned attorney is requested.

Respectfully submitted,
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